North Carolina Department of Transportation
Statewide Planning Branch
Systems Planning Unit

Thoroughfare Plan
for

May 1992

THOROUGHFARE PLAN
FOR THE
TOWN OF WINGATE

Prepared by the:

Statewide Planning Branch
Division of Highways
North Carolina Department of Transportation

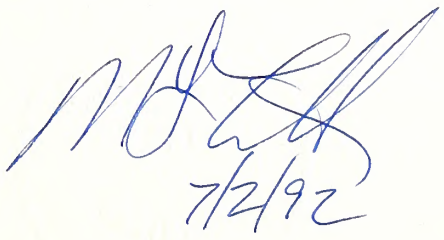
In cooperation with:

The Town of Wingate
The Federal Highway Administration
U.S. Department of Transportation

May, 1992

Persons responsible for this report:

Project Engineer:	L. F. Huntsinger
Associate Engineer:	P. Atkinson
Systems Planning Engineer:	M. L. Tewell, Jr., P.E.
Manager Statewide Planning Branch	M. R. Poole, Ph.D., P.E.
Engineering Technician:	W. P. Spohn



100 copies of this document were printed at a cost of $143.76, or $1.44 per copy (GS. 143-170.1).

LIST OF TABLES

LIST OF FIGURES

TABLE OF CONTENTS

Chapter I

INTRODUCTION

The Town of Wingate is located in Union County in the southwestern portion of North Carolina. Union County is bordered to the northwest by Charlotte, the State's largest city. South Carolina boarders the south and southwest portion of Union County. Wingate is located along US 74, a major east-west route traversing the state from the mountains to the coast. Only four miles west of Wingate, the City of Monroe provides many employment opportunities, as does the City of Charlotte, which is within a thirty-minute commuting distance.

Wingate is home to Wingate College, a growing four-year private college with undergraduate degrees in 32 major subjects. The surrounding area is rural, with agriculture and poultry production being the main industries. The town itself is mostly residential, with the remaining land use being commercial development and Wingate College along US 74. Given the relative closeness of Charlotte and Monroe to the west, it is expected that Wingate will experience positive growth and development in coming years.

There are many benefits to be derived from thoroughfare planning, but the primary objective is to enable the urban street system to be progressively developed in a manner which will adequately service future traffic demands in the Wingate area. In addition, the thoroughfare plan should embody those details of accepted thoroughfare planning principles. Major and minor thoroughfares were located based on field investigation, aerial photos, existing and anticipated land uses, and topographic conditions.

Some of the major benefits to be derived from thoroughfare planning are:

(a) A minimum amount of land will be required for street and highway purposes.

(b) Local citizens will know which streets will be developed as major thoroughfares and thus will have assurance that their residential street will not one day become a major traffic carrier.

(c) Land developers will be able to design their subdivisions so that subdivision streets will function in a non-conflicting manner with the overall plan.

It should be emphasized that the recommended plan is based on anticipated growth of the urban area as indicated by current trends. Prior to construction of specific projects, a more detailed study will be required to reconsider development trends and to determine specific locations and design requirements.

Chapter II

THOROUGHFARE PLANNING PRINCIPLES

There are many advantages to thoroughfare planning, but the primary mission is to assure that the road system will be progressively developed to adequately serve future travel desires. Thus, the main consideration in thoroughfare planning is to make provisions for street and highway improvements so that, when the need arises, feasible opportunities to make improvements exist.

Benefits of Thoroughfare Planning

There are two major benefits derived from thoroughfare planning. First, each road or highway can be designed to perform a specific function and provide a specific level of service. This permits savings in right-of-way, construction, and maintenance costs. It also protects residential neighborhoods and encourages stability in travel and land use patterns. Second, local officials are informed of future improvements and can incorporate them into planning and policy decisions. This will permit developers to design subdivisions in a non-conflicting manner, direct school and park officials to better locate their facilities, and minimize the damage to property values and community appearance that is sometimes associated with roadway improvements.

Thoroughfare Classification Systems

Streets perform two primary functions, traffic service and land access, which when combined, are basically incompatible. The conflict is not serious if both traffic and land service demands are low. However, when traffic volumes are high, conflicts created by uncontrolled and intensely developed abutting property lead to intolerable traffic flow friction. and congestion.

The underlying concept of the thoroughfare plan is that it provides a functional system of streets which permits travel from origins to destinations with directness, ease and safety. Different streets in this system are designed and called on to perform specific functions, thus minimizing the traffic and land service conflict.

A. Urban Classification

In the urban thoroughfare plan, elements are classified as major thoroughfares, minor thoroughfares, or local access streets.

Major Thoroughfares are the primary traffic arteries of the urban area providing for traffic movements within, around, and through the area.

Minor Thoroughfares are designed to collect traffic from the local access streets and carry it to the major thoroughfare system.

Local Access Streets provide access to abutting property. Local streets may be further classified as either residential, commercial and/or industrial depending upon the type of land use which they serve.

Idealized Major Thoroughfare System

The coordinated system of major thoroughfares that is most adaptable to the desired lines of travel within an urban area and which is reflected in most urban area thoroughfare plans is the radial-loop system. The radial-loop system includes radials, crosstowns, loops, and bypasses. Figure 1 page II-7.

Radial streets provide for traffic movement between points located on the outskirts of the city and the central area. This is a major traffic movement in most cities, and the economic strength of the central business district depends upon the adequacy of this type of thoroughfare.

If all radial streets crossed in the central area, an intolerable congestion problem would result. To avoid this problem, it is very important to have a system of crosstown streets which form a loop around the central business district. This system allows traffic moving from origins on one side of the central area to destinations on the other side to follow the area's border. It also allows central area traffic to circle and then enter the area near a given destination. The effect of a good crosstown system is to free the central area of crosstown traffic, thus permitting the central area to function more adequately in its role as a business or pedestrian shopping area.

Loop system streets move traffic between suburban areas of the city. Although a loop may completely encircle the city, a typical trip may be from an origin near a radial thoroughfare to a destination near another radial thoroughfare. Loop streets do not necessarily carry heavy volumes of traffic, but they function to help relieve central areas. There may be one or more loops, depending on the size of the urban area. They are generally spaced one-half mile to one mile apart, depending on the intensity of land use.

A bypass is designed to carry traffic through or around the urban area, thus providing relief to the city street system by removing traffic which has no desire to be in the city. Bypasses are usually designed to through-highway standards, with control of access. Occasionally, a bypass with low traffic volume can be designed to function as a portion of an urban loop. The general effect of bypasses is to expedite the movement of through traffic and to improve traffic conditions within the city. By freeing the local streets for use by shopping and home-to-work traffic, bypasses tend to increase the economic vitality of the local area.

Objectives of Thoroughfare Planning

Thoroughfare planning is the process public officials use to assure the development of the most appropriate street system to meet the existing and future travel desires within the urban area.

The primary aim of a thoroughfare plan is to guide the development of the street system in a manner consistent with changing traffic demands. Through proper planning for street development, costly errors and needless expense can be averted. A thoroughfare plan will enable street improvements to be made as traffic demands increase, and help eliminate unnecessary improvements. By developing the street system to keep pace with increasing traffic demands, a maximum utilization of the system can be attained that will require a minimum amount of land for street purposes. In addition to providing for traffic needs, the thoroughfare plan should embody those details of good urban planning necessary to present a pleasing and efficient urban community. The location of present and future population, commercial and industrial enterprises, affects major street and highway locations. Conversely, the location of major streets and highways within the urban area will influence the urban development pattern.

Other objectives of a thoroughfare plan include:

- To provide for the orderly development of an adequate major street system as land development occurs;
- To reduce travel and transportation costs;
- To reduce the cost of major street improvements to the public through the coordination of street system with private action;
- To enable private interests to plan their actions, improvements, and development with full knowledge of public intent;
- To minimize disruption and displacement of people and businesses through long range advance planning for major street improvements;
- To reduce environmental impacts such as air pollution, resulting from transportation; and
- To increase travel safety.

These objectives are achieved through improving both the operational efficiency of thoroughfares, and improving the system efficiency through the use of system coordination and layout.

A. Operational Efficiency

A street's operational efficiency is improved by increasing the capability of the street to carry vehicular traffic and people. In terms of vehicular traffic, a street's capacity is defined as the maximum number of vehicles which can pass a given point on a roadway during a given time period under prevailing roadway and traffic conditions. Capacity is affected by the physical features of the roadway, nature of traffic, and weather.

Physical ways to improve vehicular capacity include:

Street widening - widening a street from two to four travel lanes more than doubles the capacity by providing additional maneuverability for traffic.

Intersection improvements - increasing the turning radii, adding exclusive turn lanes, and channelizing movements can improve the capacity of an existing intersection.

Improving vertical and horizontal alignment - reduces the congestion caused by slow moving vehicles.

Eliminating roadside obstacles - reduces side friction and improves a drivers field of sight.

Operational ways to improve street capacity include:

Control of access - A roadway with complete access control can often carry three times the traffic handled by a non-controlled access street with identical lane width and number.

Parking removal - Increases capacity by providing additional street width for traffic flow and reducing friction to flow caused by parking and unparking vehicles.

One-way operation - The capacity of a street can sometimes be increased 20-50%, depending upon turning movements and overall street width, by initiating one-way traffic operations. One-way streets can also improve traffic flow by decreasing potential traffic conflicts and simplifying traffic signal coordination.

Reversible lanes - Reversible traffic lanes may be used to increase street capacity in situations where heavy directional flows occur during peak periods.

Signal phasing and coordination - Uncoordinated signals and poor signal phasing restrict traffic flow by creating excessive stop-and-go operation.

Altering travel demand is a third way to improve the efficiency of existing streets. Travel demand can be reduced or altered in the following ways:

Carpools - Encourage people to form carpools and vanpools for journeys to work and other trip purposes. This reduces the number of vehicles on the roadway and raises the people carrying capability of the street system.

Alternate mode - Encourage the use of alternate modes of travel such as transit and bicycles.

Work hours - Encourage industries, business, and institutions to stagger work hours or establish variable work hours for employees. This will reduce travel demand in peak periods and spread peak travel over a longer time period.

Land use - Plan and encourage land use development or redevelopment in a more travel efficient manner.

B. System Efficiency

Another means of altering travel demand is the development of a more efficient system of streets that will better serve travel desires. A more efficient system can reduce travel distances, time, and cost. Improvements in system efficiency can be achieved through the concept of functional classification of streets and development of a coordinated major street system.

Application of Thoroughfare Planning Principles

The concepts presented in the discussion of operational efficiency, system efficiency, functional classification, and idealized major thoroughfare system are the conceptual tools available to the transportation planner in developing a thoroughfare plan. In actual practice, thoroughfare planning is done for established urban areas and is constrained by existing land use and street patterns, existing public attitudes and goals, and current expectations of future land use. Compromises must be made because of these and the many other factors that affect major street locations.

Throughout the thoroughfare planning process it is necessary from a practical viewpoint that certain basic principles be followed as closely as possible. These principles are as follows:

1. The plan should be derived from a thorough knowledge of today's travel - its component parts, as well as the factors that contribute to it, limit it, and modify it.

2. Traffic demands must be sufficient to warrant the designation and development of each major street. The thoroughfare plan should be designed to accommodate a large portion of all major traffic movements on a relatively few streets.

3. The plan should conform to and provide for the land development plan of the area.

4. Certain considerations must be given to urban development beyond the current planning period. Particularly in outlying or sparsely developed areas which have development potential, it is necessary to designate thoroughfares on a long-range planning basis to protect rights of way for future thoroughfare development.

5. While being consistent with the above principles and realistic in terms of travel trends, the plan must be economically feasible.

IDEALIZED THOROUGHFARE PLAN

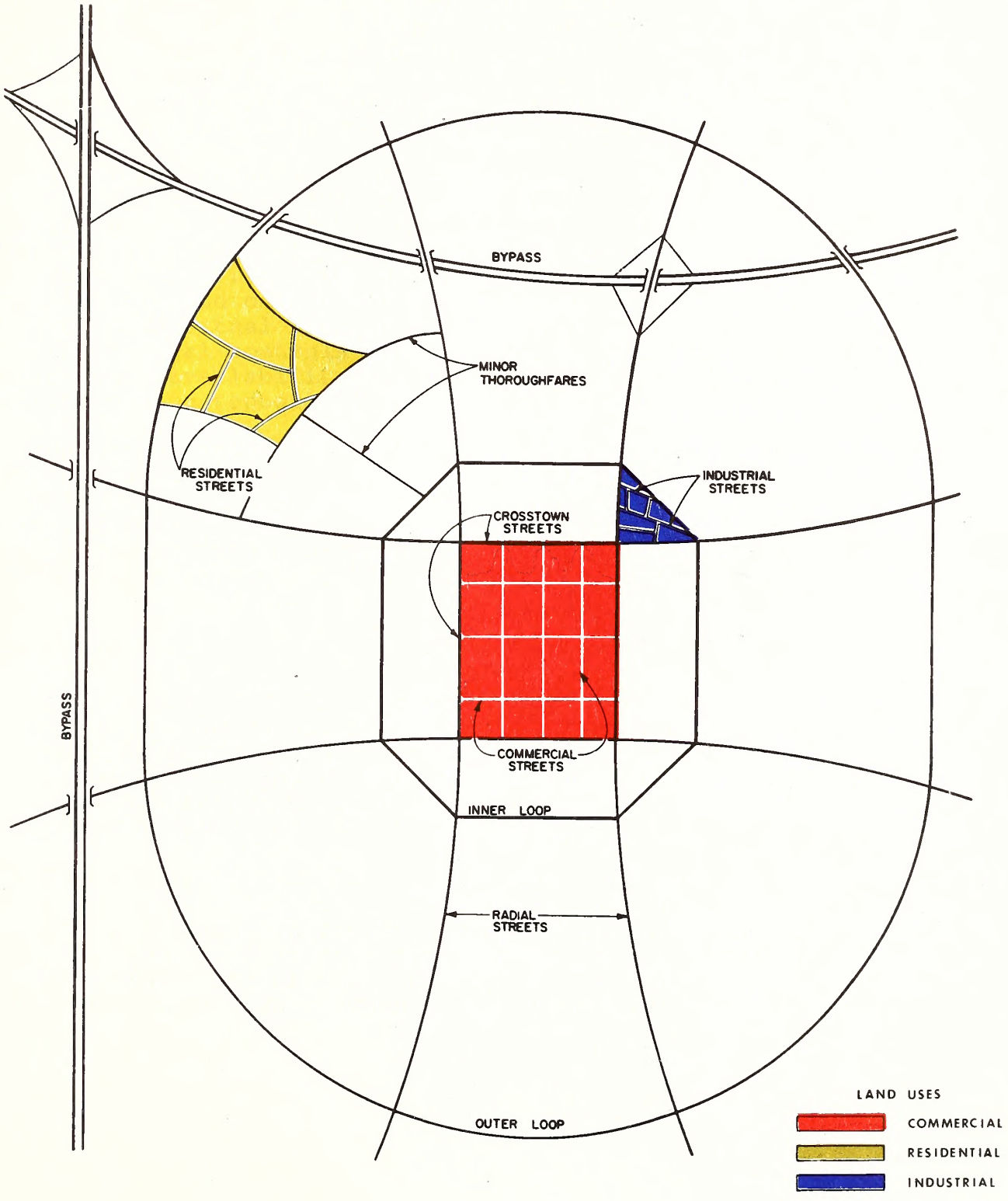


FIGURE 1

Chapter III

EXISTING CONDITIONS

The objective of thoroughfare planning is to develop a system of transport that will enable people and goods to travel safely and economically. To determine the needs of an area the factors of population, economics, and travel demand must be examined. To plan for the transportation needs of an area, it is also important to understand and define major routes, locations with accident problems, and locations with capacity deficiencies.

To fulfill the objectives of an adequate 30-year thoroughfare plan, reliable forecasts of future travel characteristics must be made. Such forecasts are possible only when the following major items are carefully analyzed: (1) historical and potential population changes; (2) significant trends in the economy; (3) the character and intensity of land development; and (4) motor vehicle registration and use. Additional items that vary in influence include the effects of legal controls such as zoning ordinances and subdivision regulations, availability of public utilities and transportation facilities, and topographic and other physical features of the area.

In order to clearly assess the needs of a transportation network, it is essential that the general characteristics of the existing system be analyzed. These characteristics include, but are not limited to, design, roadway safety, and structural elements. Any deficiencies in these areas should be reduced, if not eliminated, in an effort to provide the most efficient transportation system possible.

Population Trends

The volume of traffic on a section of roadway is a function of the size and location of the population it serves. Analysis of the population is one of the first steps for a transportation planner. The analysis of past trends allows the planner to estimate future population and the traffic that it will generate with some degree of reliability.

Given Wingate's small size and the influence of Wingate College much of Wingate's travel originates outside of the immediate area. Population trends and projections can be used as a good indicator of what to expect with traffic growth in the future. The trends and projections for the Town of Wingate, Monroe Township, and Union County are shown in Table 1 below:

TABLE 1

Population Trends and Projections

Year	Union County	Monroe Township	Town of Wingate
1940	39,097	14,127	541
1950	42,034	15,203	793
1960	44,670	18,334	1,307
1970	54,714	23,258	2,569
1980	70,380	26,261	2,615
1990	84,211	30,291	2,821
2000	102,416[1]	37,000[3]	3,600[3]
2010	118,148[1]	42,500[3]	4,100[3]
2020	133,500[2]	48,000[3]	4,600[3]

[1] Projections taken from Office of State Budget and Management, State of North Carolina, 1988.

[2] Projection based on anticipated growth.

[3] Projections based on Census population trends, and do not take into account future annexations.

As shown in Table 1, a rapid increase in Wingate's population is not expected to occur. However, as Charlotte and Monroe continue to grow to the east, Wingate will become more attractive to potential homeowners desiring to locate away from the city. With an increase in residential development, commercial development will also increase. With the introduction of new development, traffic in and around Wingate will continue to grow over the next thirty years. Improvements to existing roads and the construction of new roads will be imperative to handle this additional growth. With the focus of activity being centered on the downtown area, congestion problems will surely affect the integrity of this area if alternative routes are not planned for and constructed.

Economy and Employment

Wingate is a predominantly residential community; many of the residents work in nearby Monroe or commute to Charlotte. As with many rural areas of North Carolina, agriculture plays an important role in Wingate's economic base. Poultry production is the major industry in this area. The largest economic entity within the Town boundaries is Wingate College. There are new residential developments within the planning area. These new developments will increase the amount of traffic coming into town to buy groceries, and seek services that people need.

Travel Demand

Travel demand is generally reported in the form of average daily traffic counts. Traffic counts are taken regularly at several locations in and around Wingate by the North Carolina Department of Transportation. To estimate future travel demand, traffic trends over the past twenty years were studied.

A comparison of annual growth rates from 1970 to 1990 at various count locations in Wingate shows average annual growth rates ranging from 1.5% to 4.0%. The largest growth was noted on the lower-volume roads, where a given increase will result in a higher percentage. US 74 experienced an average growth of 1.5% to 2.0%. Appendix A and Figures 2 and 3 show existing and expected average traffic volumes based on growth rates of 2.5% to 3.0% (moderate growth). The introduction of new residential and commercial developments in the planning area will cause sharp increases in traffic growth in those immediate areas. Eventually, this increase will level off and follow the growth pattern of the surrounding area.

Major Routes

Wingate is served primarily by US 74 which provides access from the east and west. The Town is also served radially by several two-lane two-way State roads, including Austin-Chaney Road (SR 1758), McIntyre Road (SR 1631), Ansonville Road (SR 1002), Witmore Road (SR 1758), and Old Highway 74 (SR 1740). Both Monroe-Ansonville Road (SR 1751) to the north and Old Monroe-Marshville Road (SR 1957) to the south roughly parallel US 74 to provide additional access from the east and west.

Other streets in the planning area are residential, with commercial development mainly restricted to US 74. The northeastern quarter of Wingate is predominantly college property. All routes in Wingate are currently two lane, with the exception of US 74 which is a five-lane cross section within the Town of Wingate, and a four-lane divided cross section outside of Town limits.

Traffic Accidents

Traffic accident records are of assistance in locating problem areas on the highway system. The cause of traffic accidents can be broken down into three general categories: the physical environment, the driver, and the vehicle. The physical environment includes such things as road condition, weather, road obstructions, and traffic conditions. Causes associated with the driver include the driver's mental alertness, distractions in the car, ability to handle the vehicle, and reaction time. Causes associated with the physical attributes of the vehicle itself include such things as the condition of the brakes and tires, vehicle responsiveness, size of the vehicle, and how well the windshield wipers and defroster work. All traffic accidents can be attributed to one or more of these factors; however, the driver is often the primary factor.

Accident data from August 1988 through July 1991 was studied as part of the development of this report. There were no major accident problems in the Wingate area. The largest accident count for a single intersection was found at the intersection of US 74 and Main Street. This is the only signalized intersection in Wingate, as well as being the intersection of the two major routes in the area. A closer analysis of the accidents at this intersection revealed no accident patterns that could be corrected through engineering improvements.

TABLE 2

Town of Wingate Selected Accident Inventory
(August 1988 - July 1991)

Location	Type/Number of Accidents	
US 74 @ Main Street	Angle	5
	Left Turn	3
	Rear End	2
	Right Turn	1
	Ran Off Road	1
	TOTAL	12

Capacity Analysis

A good indication of the adequacy of the existing major street system is a comparison of the traffic volumes with the ability of the streets to move traffic freely at a desirable speed. The ability of a street to move traffic freely, safely, and efficiently with a minimum delay is controlled primarily by the spacing of major devices utilized. Thus, the ability of a street to move traffic can be increased by restricting parking and turning movements, using proper sign and signal devices, and by the application of other traffic engineering techniques.

Capacity is defined as the maximum number of vehicles which has a reasonable expectation of passing over a given section of a roadway in one direction, or in both directions, during a given time period under prevailing roadway and traffic conditions. The relationship of traffic volumes to the capacity of the roadway will determine **level of service** being provided. Six levels of service have been selected to identify the conditions existing under various speed and volume conditions on a highway or street.

---

[1] Highway Capacity Manual, Special Report 209, 1985, p. 1-3.

The six levels of service are illustrated in Figure 4, and they are defined on the following pages. The definitions are general and conceptual in nature, but may be applied to urban arterial levels of service. Levels of service for interrupted flow facilities vary widely in terms of both the user's perception of service quality and the operational variables used to describe them. Each chapter of the 1985 Highway Capacity Manual contains more detailed descriptions of the levels of service as defined for each facility type.

1. **Level-of-service A** describes primarily free flow-operations at average travel speeds usually about 90 percent of the free-flow speed for the arterial class. Vehicles are completely unimpeded in their ability to maneuver within the traffic stream. Stopped delay at signalized intersections is minimal.

2. **Level-of-service B** represents reasonable unimpeded operations at average travel speeds usually about 70 percent of the free-flow speed for the arterial class. The ability to maneuver within the traffic stream is only slightly restricted and stopped delays are not bothersome. Drivers are not generally subjected to appreciable tension.

3. **Level-of-service C** represents stable operations. However, ability to maneuver and change lanes in mid-block locations may be more restricted than in LOS B, and longer queues and/or adverse signal coordinations may contribute to lower average travel speeds of about 50 percent of the average free-flow speed for the arterial class. Motorists will experience an appreciable tension while driving.

4. **Level-of-service D** borders on a range on which small increases in flow may cause substantial increases in approach delay and, hence, decreases in arterial speed. Delay may be due to adverse signal progression, inappropriate signal timing, high volumes, or some combination of these. Average travel speeds are about 40 percent of free-flow speed.

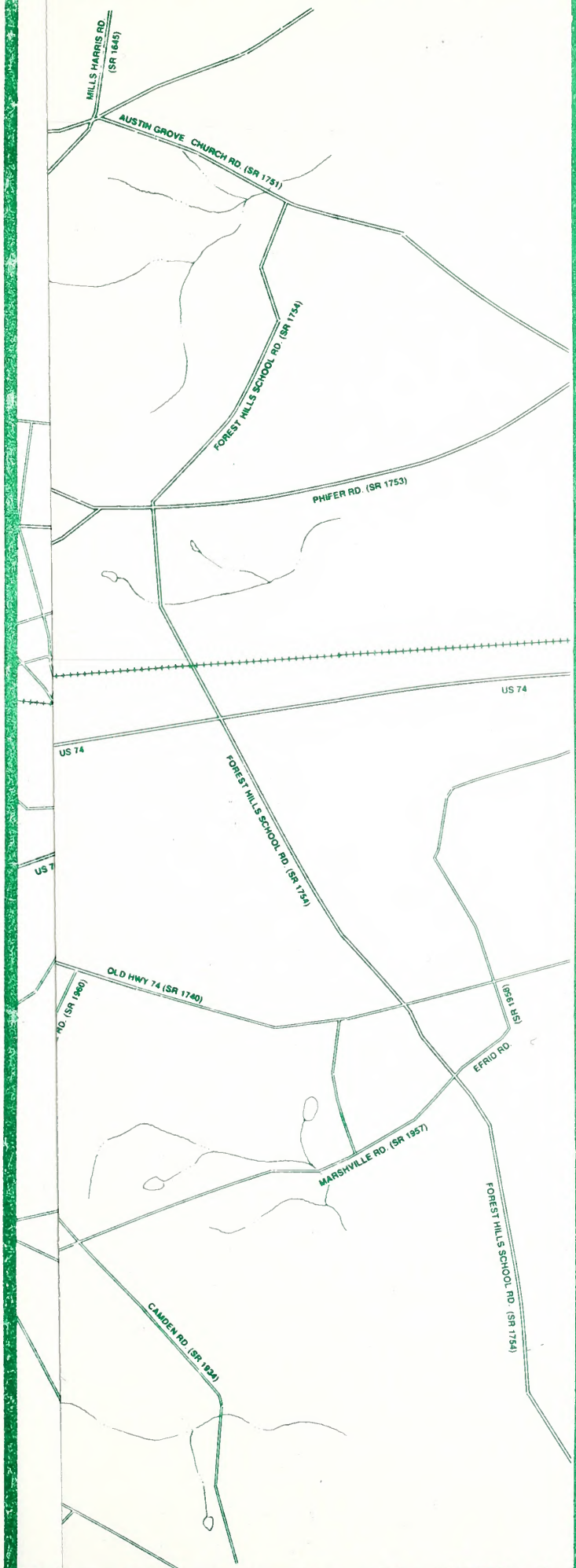
5. **Level-of-service E** is characterized by significant approach delays and average travel speeds of one-third the free-flow speed or lower. Such operations are caused by some combination of adverse progression, high signal density, extensive queuing at critical intersections, and inappropriate signal timing.

6. **Level-of-service F** characterizes arterial flow at extremely low speeds below one-third to one-quarter of the free-flow speed. Intersection congestion is likely at critical signalized locations, with high approach delays resulting. Adverse progression is frequently a contributor to this condition.

The recommended improvements and overall design of the Thoroughfare Plan were based on achieving a minimum of LOS D on existing facilities, and LOS C on new facilities. LOS D is considered the **"practical capacity"** of a facility, or that at

which the public begins to express dissatisfaction.

The only location in the Wingate area that will experience significant capacity problems in the 30-year planning period is Main Street between US 74 and Old Williams Road. Congestion in this area can be alleviated by providing adequate alternate routes from outlying areas to US 74.



LEGEND

SCHOOL

COLLEGE

1990 TRAFFIC COUNTS

WINGATE AND VICINITY

UNION COUNTY
NORTH CAROLINA

PREPARED BY THE

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

DIVISION OF HIGHWAYS-PLANNING AND ENVIRONMENTAL BRANCH

IN COOPERATION WITH

U.S. DEPARTMENT OF TRANSPORTATION

FEDERAL HIGHWAY ADMINISTRATION

0 1000 2000 3000 4000

SCALE IN FEET

FIGURE 2

BASE: OCTOBER 1991

which the public begins to express dissatisfaction.

The only location in the Wingate area that will experience significant capacity problems in the 30-year planning period is Main Street between US 74 and Old Williams Road. Congestion in this area can be alleviated by providing adequate alternate routes from outlying areas to US 74.


LEGEND
SCHOOL
COLLEGE
1990 TRAFFIC COUNTS
WINGATE
AND VICINITY
UNION COUNTY
NORTH CAROLINA
PREPARED BY THE
NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS-PLANNING AND ENVIRONMENTAL BRANCH
IN COOPERATION WITH
U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION
0 1000 2000 3000 4000
SCALE IN FEET
FIGURE 2
BASE: OCTOBER 1991
MONROE AMSONVILLE RD (SR 1751)
AUSTIN GROVE CHURCH RD (SR 1751)
HELMS FARMS RD (SR 1940)
TRULL HINSON RD (SR 1780)
OLD WILLIAMS RD (SR 1760)
AUSTIN CHAPEL RD (SR 1758)
HINSON RD (SR 1781)
BYERS RD (SR 1760)
ANSONVILLE RD (SR 1820)
FOREST HILLS SCHOOL RD (SR 1744)
PHIFER RD (SR 1753)
ZEB GOODMAN RD (SR 1755)
GOLF COURSE
TOWN LIMITS
W. ELM ST
E. ELM ST
W. MAIN ST
E. MAIN ST
N. MAIN ST
FORDAM ST
W. WILSON ST
E. WILSON ST
CEMETERY ST
US 74
19300
18000
14600
PRESSON RD (SR 1942)
E. EXHAUST ST
S. MAIN ST
SYCAMORE CHURCH RD (SR 1941)
OLD HWY 74 (SR 1740)
CAGLE RD (SR 1945)
LEE PARKS RD (SR 1941)
SUMMERLIN DAIRY RD (SR 1953)
OLD US 74
WALKER CHURCH RD
WHITMIRE RD (SR 1746)
MARSHVILLE RD (SR 1927)
EPHO RD
FOREST HILLS SCHOOL RD (SR 1744)
OLD FAIRVIEW-MONROE RD (SR 1941)
WHITE STORE RD (SR 1952)
OLD MONROE RD (SR 1957)
GILBOA CHURCH RD (SR 1905)
CAGLE RD (SR 1934)
US 601
SUGG FORK CHURCH
SUGG FORK RD (SR 1945)

LEGEND

	EXISTING	PROPOSED
MAJOR THOROUGHFARE		
FREEWAYS		
OTHER		
MINOR THOROUGHFARE		
SCHOOL		
COLLEGE		

LEGEND

0000 2020 ADT W/O T.P.
0000 2020 ADT WITH T.P.

PROJECTED TRAFFIC COUNTS

FIGURE 3

ADOPTED BY:
UNION COUNTY _____

ADOPTED BY:
TOWN OF WINGATE MARCH 2, 1992

RECOMMENDED FOR APPROVAL BY: M.R. Poole
STATEWIDE PLANNING BRANCH MARCH 10, 1992

ADOPTED BY:
DEPT. OF TRANSPORTATION _____

PUBLIC MEETING: FEBRUARY 17, 1992

PUBLIC HEARING: MARCH 2, 1992

THOROUGHFARE PLAN

WINGATE AND VICINITY

UNION COUNTY NORTH CAROLINA

PREPARED BY THE

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS-PLANNING AND ENVIRONMENTAL BRANCH

IN COOPERATION WITH

U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION

0 1000 2000 3000 4000

SCALE IN FEET

FEBRUARY 5, 1992

BASE: OCTOBER 1991

LEGEND

	EXISTING	PROPOSED
MAJOR THOROUGHFARE		
FREEWAYS		
OTHER		
MINOR THOROUGHFARE		
SCHOOL		
COLLEGE		

LEGEND

0000 2020 ADT W/O T.P.
0000 2020 ADT WITH T.P.

PROJECTED TRAFFIC COUNTS

FIGURE 3

ADOPTED BY:
UNION COUNTY

ADOPTED BY:
TOWN OF WINGATE MARCH 2, 1992

RECOMMENDED FOR APPROVAL BY:
STATEWIDE PLANNING BRANCH MARCH 10, 1992

ADOPTED BY:
DEPT. OF TRANSPORTATION

PUBLIC MEETING: FEBRUARY 17, 1992

PUBLIC HEARING: MARCH 2, 1992

THOROUGHFARE PLAN

WINGATE AND VICINITY

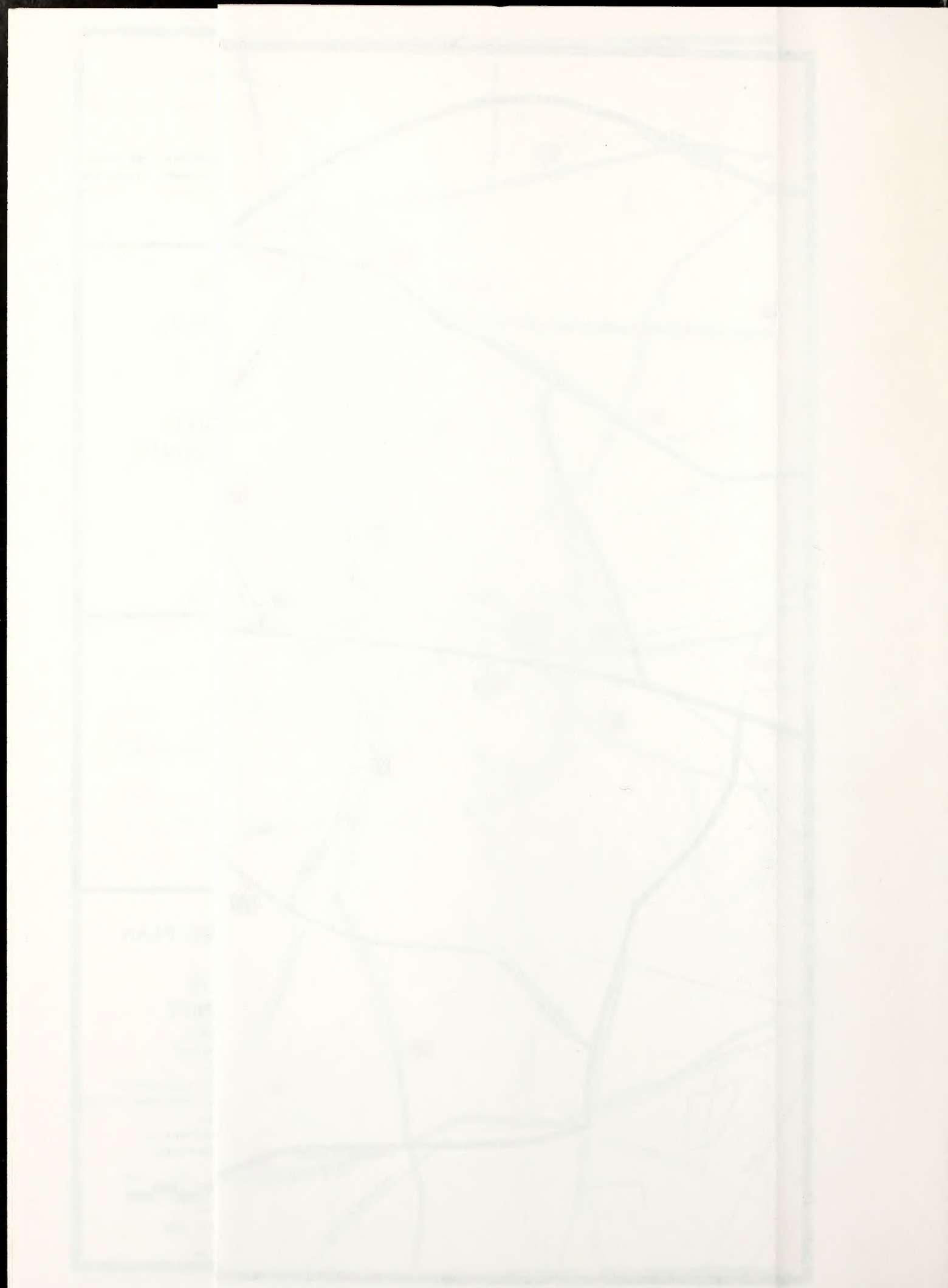
UNION COUNTY
NORTH CAROLINA

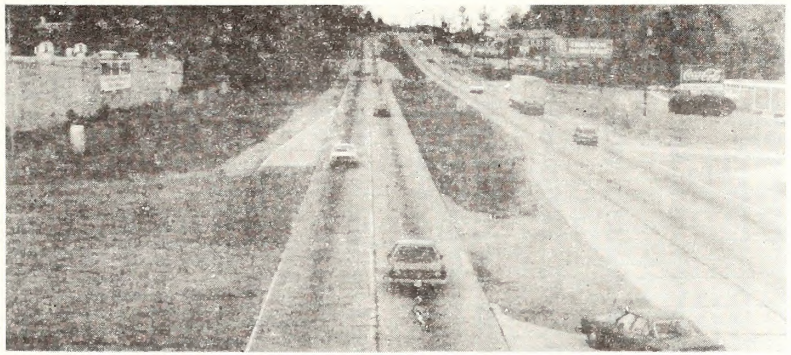
PREPARED BY THE
NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS-PLANNING AND ENVIRONMENTAL BRANCH
IN COOPERATION WITH
U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION

0 1000 2000 3000 4000
SCALE IN FEET

FEBRUARY 5, 1992

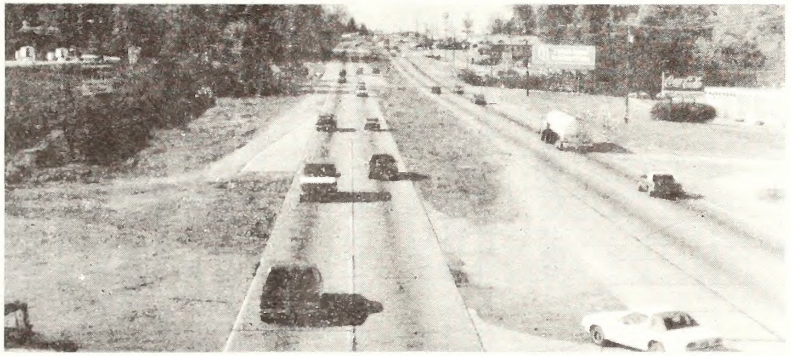
BASE: OCTOBER 1991





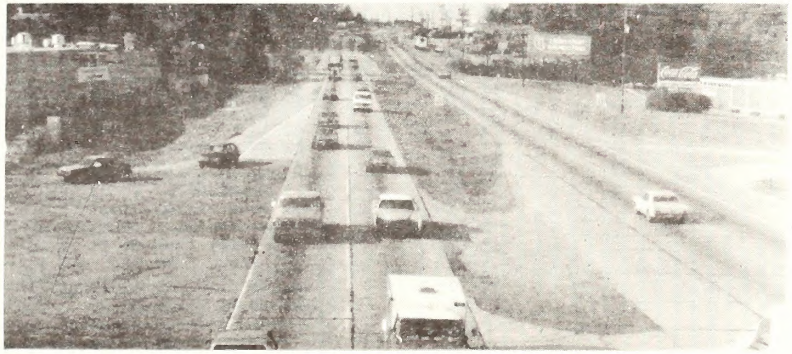
LEVEL OF SERVICE - A

LEVEL OF SERVICE - D



LEVEL OF SERVICE - B

LEVEL OF SERVICE - E



LEVEL OF SERVICE - C

LEVEL OF SERVICE - F

LEVELS OF SERVICE

FIGURE 4

Chapter IV

RECOMMENDATIONS

The recommended thoroughfare plan for the Town of Wingate is shown in Figure 5. More detail on physical and operational characteristics is given in Appendix A, Table 4.

There are many two-lane facilities in the area that are less than 24 feet wide (12-foot lanes). It is desirable from an operations and safety standpoint that all roads with less than 24 feet of pavement be widened to 24 feet. These facilities are given in Appendix A, Table 4.

Elements of the Wingate Thoroughfare Plan are as follows:

Major Thoroughfares

These are the streets which serve the primary traffic movements in the Town of Wingate.

1. US 74
2. Ansonville Road (SR 1002)
3. Austin-Chaney Road (SR 1758)
4. Bivens Road (SR 1763)
5. Forest Hills School Road (SR 1754)
6. Main Street (SR 1758)
7. Marshville Road/Old Monroe Road (SR 1957)
8. Monroe-Ansonville Road (SR 1751)
9. Pageland-Monroe Road (SR 1941)
10. Witmore Road (SR 1758)

Proposed Major Thoroughfare

1. Connector Road between US 74 and Ansonville Road

Recommendations for Major Thoroughfares

Listed below are the suggested improvements for the major thoroughfare system in the Wingate Planning Area during the period from 1990-2020.

US 74 - This is a four-lane divided facility (five-lanes within Wingate) that carries the majority of traffic in the planning area. US 74 is part of North Carolina's Intrastate System, and is a vital link to the urban areas of Monroe and Charlotte. The traffic along US 74 is predominantly through traffic with origins and destinations outside of the planning area. The traffic projections in this report indicate that this roadway will be nearing capacity within the 30-year planning period. However, construction of the US 74 bypass at some point east of Wingate will alleviate this problem. Special care should be taken to protect the traffic carrying ability of US 74 through Wingate by guarding against strip development.

Ansonville Road (SR 1002) - This is a two-lane facility with 20-foot lanes running radially in a north-easterly direction from Wingate College. This roadway provides access from outlying areas to and from US 74. To improve the safety and capacity of this roadway, it is recommended that this roadway be widened to 24-feet.

North Main Street (SR 1758) - This two-lane facility is the main north/south street in Wingate. Its intersection with US 74 is the only signalized intersection in the planning area. North Main Street is designated as Austin-Chaney Road beyond Wingate town limits. This roadway provides direct access to downtown Wingate from the north. Generally, on-street parking should not be allowed on major thoroughfares. In an effort to improve the safety and operations of this roadway, it is recommended that on-street parking be removed and "No Parking" zones be enforced.

Witmore Road (SR 1758) - This two-lane facility, which is designated as South Main Street within town limits, provides the major north/south movement from the southern portion of the planning area. It has a roadway width of 18-feet and poor vertical alignment. To improve its function as a major thoroughfare, it is recommended that this roadway be widened to 24-feet.

Proposed new or improved major thoroughfares include:

Connector Road between US 74 and Ansonville Road - Currently, the best route serving traffic between US 74 and the northeastern portion of the planning area is N. Camden Street to Ansonville Road. The utilization of this route sends high volumes of traffic through the campus of Wingate College. This traffic movement is not only an indirect route, but also poses an increased safety risk for pedestrians on the campus. To provide a safer and more direct route in this area, it is recommended that a connector route be provided between US 74 and Ansonville Road. The construction of this facility will reduce the number of passenger vehicles and remove truck traffic from the college campus. To provide better access for emergency vehicles and improved traffic flows, this connector should be constructed with a grade separation at the crossing of the CSX railway.

Minor Thoroughfares

The roadways serving as minor thoroughfares collect traffic from the local access streets in the Wingate Planning area, and carry it to the major thoroughfares.

1. Ansonville Road (SR 1002)
2. Bivens Street (SR 1762)
3. Edgewood Drive (SR 1776)
4. McIntyre Road (SR 1631)
5. N. Camden Street (SR 1767)
6. Old Highway 74 (SR 1740)
7. Old Williams Road (SR 1760)
8. Summerlin Dairy Road (SR 1962)

Proposed Minor Thoroughfares

1. McIntyre Road/US 74 Connector
2. US 74/Summerlin Dairy Road Connector
3. Summerlin Dairy Road Extension

Recommendations for Minor Thoroughfares

Listed below are the suggested improvements for the minor thoroughfare system in the Wingate Planning Area during the period from 1990-2020.

Ansonville Road (SR 1002) - The section of Ansonville Road between Burris Street and North Camden Street is designated as a minor thoroughfare. This roadway should primarily serve local and college traffic. The construction of the connector route between US 74 and Ansonville Road will provide relief to this route from through and truck traffic. When the connector is competed, this section of Ansonville Road should be signed for no through trucks.

Proposed new or improved minor thoroughfares are:

McIntyre Road/US 74 Connector - Currently, the only continuous route for traffic travelling from the northern portion of the planning area to US 74 is North Main Street. As Wingate develops, North Main Street will become more congested. The provision of a connector route linking McIntyre Road and US 74 will serve as an inner loop for Wingate. It will provide easier access to major and minor thoroughfares from US 74.

Loop facilities serve important functions because they provide lateral travel movements between outlying areas, therefore relieving central areas and minimizing travel time and user costs. This roadway will help to relieve future congestion in the center of town as well as provide access for anticipated development.

A function of this route will be to provide improved access to the proposed US 74 Bypass for commercial vehicles serving industrial sites located in the western portion of Wingate.

Edgewood Drive Extension - This extension will provide the residential development in this area with a connection to the US 74/McIntyre Road Connector. This connection will provide motorists with a more direct route to the proposed bypass as well as improved crosstown movements in and around Wingate.

US 74/Summerlin Dairy Road Connector and Summerlin Dairy Road Extension - As Wingate continues to grow and develop in the southern portion of the planning area, there will be an increasing need for a roadway facility to provide easier access to the major and minor thoroughfares, and relieve the central business district. The combination of these proposed facilities will serve as a southern loop for Wingate providing better crosstown travel movements, therefore minimizing travel times and user costs.

Bivens Street Intersection - Wingates elementary school is located on Bivens Street near the intersection of US 74. During morning and afternoon peaks, this intersection experiences problems with large volumes of school traffic on Bivens Street, and through traffic on US 74. The Town of Wingate has expressed a concern over safety and delay at this intersection. The parcel of land along US 74 across from the Bivens Street intersection is proposed for development as a retail site. This type of development will further complicate the problem at this intersection.

A study completed by the Division Engineer for Wingate indicates that current traffic volumes at this intersection do not warrant the installation of a traffic signal. However, future conditions could magnify the problem experienced at this intersection. It is recommended that the Town of Wingate request an additional study after the construction of the retail site is complete.

Construction Improvements and Cost Estimates

Construction priorities will vary depending on what criteria are considered and what weight is attached to the various criteria. Most people would agree that improvements to the major thoroughfare system and major traffic routes would be more important than minor thoroughfares where traffic volumes are lower. To be in the State's Transportation Improvement Program, a project must show favorable benefits relative to costs and should not be prohibitively disruptive to the environment. Based on these considerations the improvements shown in Table 3 are recommended.

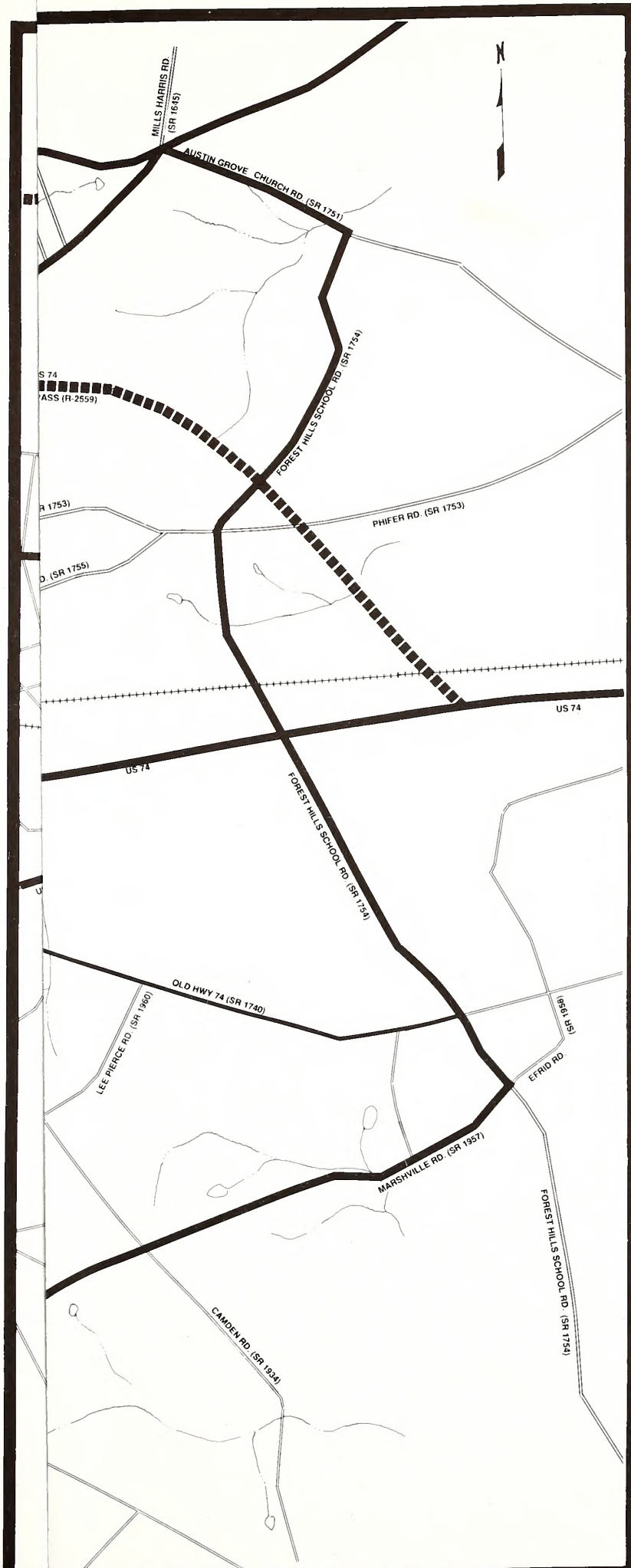
TABLE 3 - Wingate Thoroughfare Plan Benefits and Cost Estimates

DESCRIPTION	LENGTH (MI)	COST ($ x 1000)	USER BENEFITS	ECONOMIC DEVELOPMENT POTENTIAL	ENVIRONMENTAL IMPACTS POSITIVE	NEGATIVE
US 74/Ansonville Rd Conn.	0.50	1,400	4,280	0.77	0.40	0.20
US 74/McIntyre Rd Conn.	1.70	1,720	7,140	0.90	0.25	0.10
Edgewood Drive Extension	0.23	300	870	0.50	0.10	0.10
US 74/Summerlin Dairy	1.10	1,115	4,150	0.60	0.25	0.10

Environmental Concerns

The importance of the environment is becoming increasingly apparent and there is a need to make every effort to preserve it. In looking at proposed thoroughfares it is desirable to locate a corridor that will do the least amount of damage to the environment. The main environmental concerns that are examined at the thoroughfare plan stage are: the lay of the land, air quality, wetlands, wildlife, historic properties, neighborhoods, noise, schools, churches, and parks.

Several of the proposed projects on Wingates Thoroughfare plan involve creek crossings. To reduce the impact on the creeks, crossings should be done at right angles. One of the principle causes of lower air quality is traffic congestion. The implementation of this plan will help guard against future traffic congestion and poor air quality.



LEGEND

	EXISTING	PROPOSED
MAJOR THOROUGHFARE		
FREEWAYS	▬▬▬	▬ ▬ ▬
OTHER	▬▬▬	▬ ▬ ▬
MINOR THOROUGHFARE	▬▬▬	- - -
SCHOOL		
COLLEGE		

ADOPTED BY:
TOWN OF WINGATE MARCH 2, 1992

RECOMMENDED FOR APPROVAL BY: N.R. Poole
STATEWIDE PLANNING BRANCH MARCH 10, 1992

ADOPTED BY:
DEPT. OF TRANSPORTATION APRIL 4, 1992

PUBLIC MEETING: FEBRUARY 17, 1992

PUBLIC HEARING: MARCH 2, 1992

FIGURE 5

THOROUGHFARE PLAN

WINGATE AND VICINITY

UNION COUNTY NORTH CAROLINA

PREPARED BY THE

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

DIVISION OF HIGHWAYS-PLANNING AND ENVIRONMENTAL BRANCH

IN COOPERATION WITH

U.S. DEPARTMENT OF TRANSPORTATION

FEDERAL HIGHWAY ADMINISTRATION

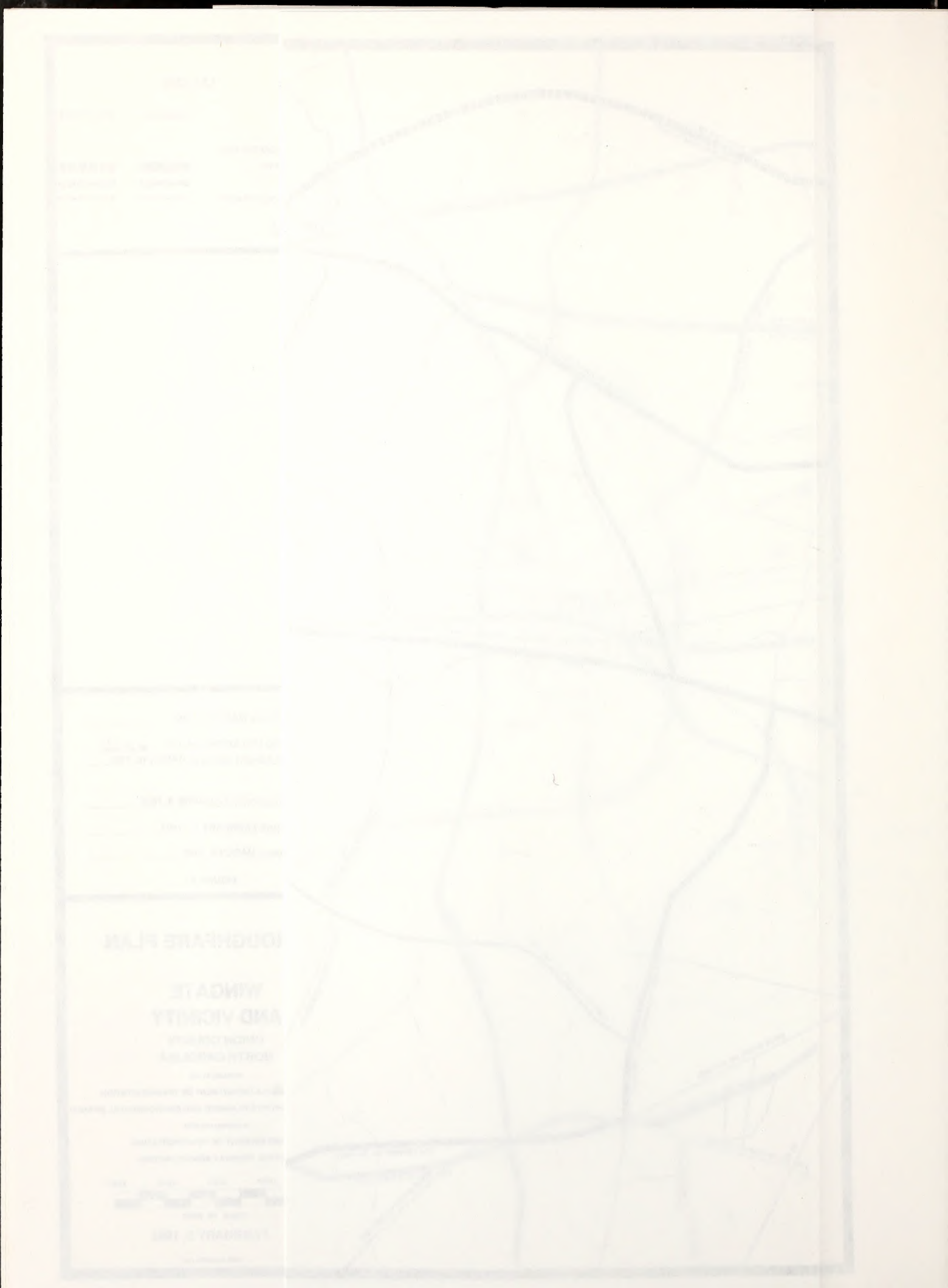
0 1000 2000 3000 4000

SCALE IN FEET

FEBRUARY 5, 1992

BASE: OCTOBER 1991


TENTATIVE US 74
MONROE BYPASS (R-2559)
MONROE-ANSONVILLE RD. (SR 1751)
MILLS HARRIS RD. (SR 1749)
NORTH GROVE CHURCH RD. (SR 1752)
HILL HYDEN RD. (SR 1755)
OLD WAXHAW RD. (SR 1748)
MAPLE ST.
WHITEVILLE RD. (SR 1747)
ANSONVILLE RD. (SR 1007)
FOREST HILLS SCHOOL RD. (SR 1754)
PHIFER RD. (SR 1753)
ZEB GOODMAN RD. (SR 1750)
PARKS RD. (SR 1749)
TOWN LIMITS
N. MAIN ST.
OAK ST.
CEDAR ST.
ELM ST.
W. ELM ST.
W. WILSON ST.
E. WILSON ST.
COMMERCE ST.
US 74
PROVIDENCE RD. (SR 1903)
S. STEWART ST.
S. MAIN ST.
OLD HWY 74 (SR 1740)
SUMMERLIN DAIRY RD. (SR 1947)
SUMMERLIN DAIRY RD. (SR 1747)
OLD US 74
OLD MONROE RD. (SR 1957)
WHITE STORE RD. (SR 1903)
WALLACE CHAPEL CHURCH RD. (SR 1941)
WALLACE GROVE CHURCH RD.
WITHERS RD. (SR 1758)
CAMDEN RD. (SR 1934)
LEE FARMS RD. (SR 1905)
MARSHVILLE RD. (SR 1927)
OLDROA CHURCH RD. (SR 1940)
HASTEN STORE RD. (SR 1941)
EFIRD RD.
LEGEND
EXISTING
PROPOSED
MAJOR THOROUGHFARE
FREEWAYS
OTHER
MINOR THOROUGHFARE
SCHOOL
COLLEGE
ADOPTED BY:
TOWN OF WINGATE MARCH 2, 1992
RECOMMENDED FOR APPROVAL BY:
STATEWIDE PLANNING BRANCH MARCH 10, 1992
ADOPTED BY:
DEPT. OF TRANSPORTATION APRIL 4, 1992
PUBLIC MEETING: FEBRUARY 17, 1992
PUBLIC HEARING: MARCH 2, 1992
FIGURE 5
THOROUGHFARE PLAN
WINGATE
AND VICINITY
UNION COUNTY
NORTH CAROLINA
PREPARED BY THE
NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS-PLANNING AND ENVIRONMENTAL BRANCH
IN COOPERATION WITH
U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION
0 1000 2000 3000 4000
SCALE IN FEET
FEBRUARY 5, 1992
MAP - OCTOBER 1991



Chapter V

ADMINISTRATIVE CONTROLS AND IMPLEMENTATION TOOLS

There are several tools available for use by the Town to assist in the implementation of a thoroughfare plan. They are as follows:

State and Municipal Adoption of the Thoroughfare Plan

Chapter 136, Article 3A, Section 136-66.2 of the General Statutes of North Carolina provides that after development of a thoroughfare plan, the plan may be adopted by the governing body of the municipality and the Department of Transportation to serve as the basis for future street and highway improvements. The General Statutes also require that, as part of the plan, the governing body of the municipality and Department of Transportation shall reach agreement on responsibilities for existing and proposed streets and highways included in the plan. Facilities which are designated a State responsibility will be constructed and maintained by the Division of Highways. Facilities which are designated a municipal responsibility will be constructed and maintained by the municipality.

After mutual plan adoption, the Department of Transportation will initiate negotiations leading to determining which of the existing and proposed thoroughfares will be a Department responsibility and which will be a municipal responsibility. Chapter 136, Article 3A, Section 136-66.1 of the General Statutes provides guidance in the delineation of responsibilities. In summary, these statutes provide that the Department of Transportation shall be responsible for those facilities which serve volumes of through traffic and traffic from outside the area to major business, industrial, governmental, and institutional destinations located inside the municipality. The municipality is responsible for those facilities which serve primarily internal travel.

Unless implementation is an integral part of the transportation planning process, the effort and expense associated with developing a plan is lost. To neglect the implementation process is a three-fold loss . . . the loss of the capital expenditures used in developing a plan, the opportunity cost of the capital expenditures, and more importantly the loss of the benefits which would accrue from an improved transportation system.

Administrative controls and implementation tools which can aid in the implementation process are generally available to cities and municipalities through Federal and State Legislation. These controls and tools will be discussed in this chapter. They include: Subdivision Regulations, Zoning Ordinances, Official Maps, Urban Renewal, Capital Improvements Programs, and Development Reviews. Generally, two issues play a major role in the implementation process - available finances and citizen involvement. Effective use of the controls and tools listed above are indicative of good planning and minimize the

effects of limited finances and negative citizen reaction to specific elements of a plan. It is through good planning that maximum use is made of every available dollar and that citizen involvement and approval of the transportation plan is obtained.

Subdivision Regulations

Subdivision regulations are locally adopted laws governing the process of converting raw land into building sites. From the planner's view, subdivision regulations are important at two distinct levels. First, they enable the planner to coordinate the otherwise unrelated plans of a great many individual developers. This process assures that provision is made for land development elements such as roadway right-of-way, parks, school sites, water lines and sewer outfalls, and so forth. Second, they enable the planner to control the internal design of each new subdivision so that its pattern of streets, lots, and other facilities will be safe, pleasant, and economical to maintain.

To be most effective, subdivision regulations and their administration must be closely coordinated with other local governmental policies and ordinances. Among the more important of these are the Comprehensive Growth Plan, Utilities Extension Master Plan, and Thoroughfare Plan.

In practice, subdivision regulations can provide some very positive benefits such as requiring portions of major streets to be constructed in accordance with the Thoroughfare Plan, or requiring subdividers to provide for the dedication and/or reservation of rights-of-way in advance of construction. These practices reduce the overall cost of the plan by having some costs borne by developers. The US 74/McIntyre Road project is a project in Wingate that could be implemented or protected by subdivision ordinances.

Recommended Subdivision Ordinances are included in Appendix B.

Zoning Ordinances

Zoning is probably the single most commonly used legal device available for implementing a community's land-use plan. To paraphrase the U.S. Department of Commerce 1924 Standard Zoning Enabling Act, on which most present-day legislation is based, zoning may be defined as the division of a municipality (or other governmental unit) into districts, and the regulation within the districts of:

1. the height and bulk of buildings and other structures,

2. the area of a lot which may be occupied and the size of required open spaces,

3. the density of population, and

4. the use of buildings and land for trade, industry, residence, or other purposes.

The characteristic feature of the zoning ordinance that distinguishes it from most other regulations is that it differs from district to district, rather than being uniform throughout a city. Thus, a given area might be restricted to single-family residential development with minimum lot size requirements and setback provisions appropriate for development. In other areas, commercial or industrial development might be permitted, and regulations would be enacted to control such development. Building code provisions or sanitary regulations, on the other hand, normally apply to all buildings in a certain category regardless of where they may be situated within a city.

The zoning ordinance does not regulate the design of streets, utility installation, the reservation or dedication of parks, street rights-of-way, school sites, and related matters. These are controlled by subdivision regulations or possibly by use of an official map. The zoning ordinance should, however, be carefully coordinated with these and other control devices.

Official Maps

The roadway corridor official map (or simply official map) is a document, adopted by the legislative body of the community, that pinpoints and preserves the location of proposed streets against encroachment. In effect, the official map serves notice to developers that the State or municipality intends to acquire certain specific property. The official map serves as a positive influence for sound development by reserving sites for public improvements in anticipation of actual need.

The NCDOT position is that it will limit the use of official maps to large scale, fully controlled-access facilities planned for rapidly developing areas outside of municipal jurisdictions. For projects within municipal jurisdictions, official maps should be prepared and adopted by the local government. Municipalities may adopt official maps that extend beyond their extraterritorial jurisdiction with approval from the Board of County Commissioners.

It should be recognized that an official map places severe but temporary restrictions on private property rights. These restrictions are in the form of a prohibition, for up to three years, on the issuance of building permits or the approval of subdivisions on property lying within an official map alignment. The three year reservation period begins with the request for development approval. This authority should be used carefully and only in cases where less restrictive powers are found to be ineffective.

Requests for NCDOT to prepare and adopt an official map should be directed to the manager of the Program and Policy Branch. For cities contemplating the adoption of an official map, there are two ways in which the city may proceed. The first is to

consider the official map statute as a stand-alone authority and use it as the basis for local adoption of an official map. Alternatively, the second approach is to adopt a local ordinance modeled after the statute, but modified to fit local circumstances and to clarify the statute. Regardless of the approach taken, several procedural steps will need to be considered, such as establishing procedures for consideration of variance petitions.

Once the project has been selected and the alignment determined, maps must be prepared that are suitable for filing with the county Register of Deeds Office. The map should show the proposed alignment in sufficient detail to identify the functional design and the preliminary right-of-way boundaries. Since the purpose of the map is to show the effect on properties along the project path, the existing property boundaries should be identified. As an additional requirement, within one year of the adoption of an official map, work must begin on preliminary engineering or an environmental impact study.

It is important to recognize the risks inherent in the adoption of an official map prior to completing the environmental studies. Projects using any federal funds require the unbiased evaluation of alternate alignments. This means that alternates will be studied and compared to the protected alignment. [1]

The above information is only to serve as an introduction to official maps, and in no way provides the information necessary to begin development of an official map. The Program and Policy Branch of the North Carolina Department of Transportation is responsible for facilitating the adoption of Official Street Maps. Cities considering Official Street Map projects should contact this Branch for their "Guidelines for Municipalities Considering Adoption of Roadway Corridor Official Maps" at:

Programming and Policy Branch
NC Department of Transportation
P.O. Box 25201
Raleigh, North Carolina 27611

Urban Renewal

Urban renewal plays a minor role in the transportation planning implementation process in terms of scope and general influence. However, under the right circumstances, renewal programs can make significant contributions. Provisions of the New Housing Act of 1974 (as amended) call for the conservation of good areas, rehabilitation of declining areas, and clearance of slum

---

[1] "Guidelines for Municipalities Considering Adoption of Roadway Corridor Official Maps", prepared by NCDOT Program and Policy Branch.

areas. In the course of renewal, it is important to coordinate with the Thoroughfare Plan to see if additional set-backs or dedication of rights-of-way are needed.

Continued use of urban renewal programs to improve the transportation system is encouraged. Changes that can be made under this program are generally not controversial or disruptive given the trauma of the clearance of a significant area.

Capital Improvement Programs

Capital programs are simply the coordination of planning and money. The Capital Improvements Program, with respect to transportation, is a long-range plan for the spending of money on street improvements, acquisition of rights-of-way and other improvements within the bounds of projected revenues. Municipal funds should be available for construction of street improvements which are a municipal responsibility, right-of-way cost sharing on facilities designated a Division of Highways responsibility and advance purchase of right-of-way where such action is warranted.

Historically cities and towns have depended, to a great degree, on Federal or State funding to solve their transportation problems. Chapter 136-Article 3A of the Road and Highway Laws of North Carolina clearly outlines the responsibilities and obligations of the various governmental bodies regarding highway improvements. North Carolina Highway Bill 1211, passed in 1988, limits the role of municipalities to specific limits in right-of-way cost sharing. Set-back regulations, right-of-way dedications and reservations play a major role in the ultimate cost of many facilities. Only in special cases will the municipality be able to enjoy the benefits of highway improvement without some form of investment.

Development Reviews

Driveway access to a State-maintained street or highway is reviewed by the District Engineer's office and by the Traffic Engineering Branch of the North Carolina Department of Transportation prior to access being allowed. Any development expected to generate large volumes of traffic (i.e. shopping centers, fast food restaurants, large industries, etc.) may be comprehensively studied by staff from the Traffic Engineering, Statewide Planning, and Roadway Design Branches of NCDOT. If done at an early stage, it is often possible to significantly improve the development's accessibility at minimal expense. Since the municipality is the first point of contact for developers, it is important that the municipality advise them of this review requirement and cooperate in the review process.

Other Funding Sources

1. Assess user impact fees to fund transportation projects. These fees, called "facility fees" in the legislation, are to be based upon "reasonable and uniform considerations of capital costs to be incurred by the town as a result of new construction. The facility fee must bear a direct relationship to additional or expanded public capital costs of the community service facilities to be rendered for the inhabitants, occupants of the new construction, or those associated with the development process".

2. Enact a bond issue to fund street improvements.

3. Continue to work with NCDOT to have local projects included in the Transportation Improvement Program (TIP).

4. Consider the possibility of specific projects qualifying for federal demonstration project funds.

5. Adopt a collector street plan that would assess buyer or property owners for street improvement.

6. Charge a special assessment for utilities; for example, increase water and sewer bills to cover cost of street improvements.

APPENDIX A

Typical Cross Sections

Typical cross sections recommended by the Thoroughfare Planning Unit are shown in Figure 6, page A-3 and listed in Table 4, page A-5.

Cross section "A" is illustrative for controlled-access freeways. The 46-foot grassed median is the least desirable median width, but there could be some variation from this depending upon design considerations. Slopes of 8:1 into 3-foot drainage ditches are desirable for traffic safety. Right-of-way requirements would typically vary upward from 250 feet depending upon cut and fill requirements.

Cross section "B" is typical for four-lane divided highways in rural areas which may have only partial or no control of access. The minimum median width for this cross section is 30 feet, but a wider median is desirable. Design requirements for slopes and drainage would be similar to cross section "A", but there may be some variation from this depending upon right-of-way constraints.

Cross section "C", seven-lane urban, and cross section "D", five-lane urban, are typical for major thoroughfares where frequent left turns are anticipated as a result of abutting development or frequent street intersections.

Cross sections "E" and "F" are used on major thoroughfares where left turns and intersecting streets are not as frequent. Left turns would be restricted to a few selected intersections.

Cross section "G" is recommended for urban boulevards or parkways to enhance the urban environment and to improve the compatibility of major thoroughfares with residential areas. A minimum median width of 24 feet is recommended with 30 feet being desirable.

Typical cross section "H" is recommended for major thoroughfares where projected travel indicates a need for four travel lanes but traffic is not excessively high, left turning movements are light, and right-of-way is restricted. An additional left turn lane would probably be required at major intersections.

Thoroughfares which are proposed to function as one-way traffic carriers would typically require cross section "I". Cross sections "J" and "K" are usually recommended for minor thoroughfares since these facilities usually serve both land service and traffic service functions. Cross section "J" would be used on those minor thoroughfares where parking on both sides is needed as a result of more concentrated development.

Cross section "L" is used in rural areas or for staged construction of a wider multi-lane cross section. On some thoroughfares projected traffic volumes may indicate that two travel lanes will adequately serve travel for a considerable period of time.

The curb and gutter urban cross sections all illustrate the sidewalk adjacent to the curb with a buffer or utility strip between the sidewalk and the minimum right-of-way line. This permits adequate setback for utility poles. If greater separation between the road and the sidewalk is desired for pedestrian safety or aesthetics, additional right-of-way must be provided to insure adequate setback for utility poles.

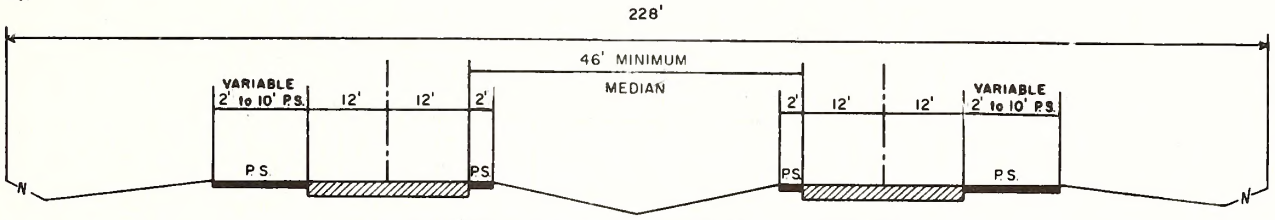
Rights-of-way shown for the typical cross sections are the minimum rights-of-way required to contain the street, sidewalks, utilities, and drainage facilities. Cut and fill requirements may require either additional right-of-way or construction easements. Obtaining construction easements is becoming the more common practice for urban thoroughfare construction.

If there is sufficient bicycle traffic along the thoroughfare to justify a bicycle lane or bikeway, additional right-of-way may be required to allow for the bicycle facilities. The North Carolina Bicycle Facility and Program Handbook should be consulted for design standards for bicycle facilities.

Recommended typical cross sections for thoroughfares were derived on the basis of projected traffic, existing capacities, desirable levels of service and available right-of-way.

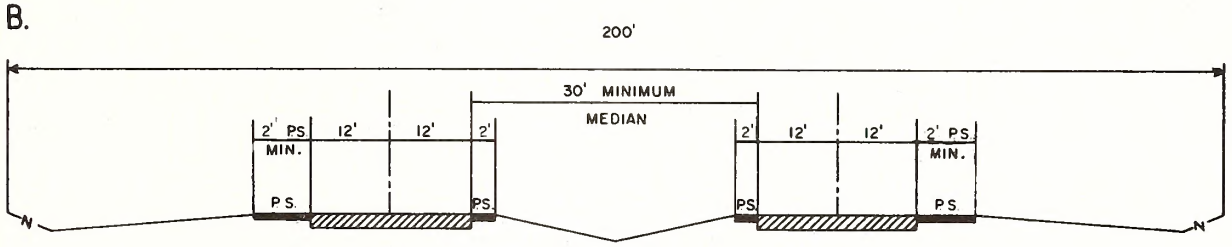
TYPICAL THOROUGHFARE CROSS SECTIONS

A.



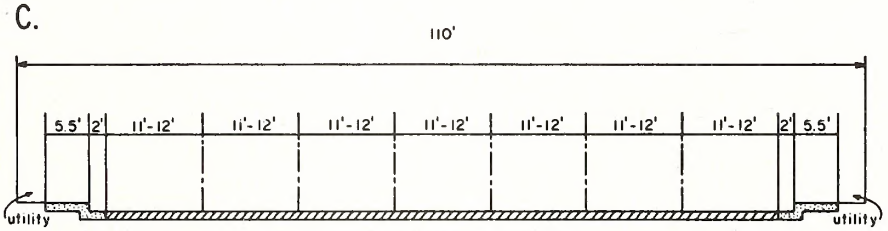
FOUR LANES DIVIDED WITH MEDIAN - FREEWAY

B.



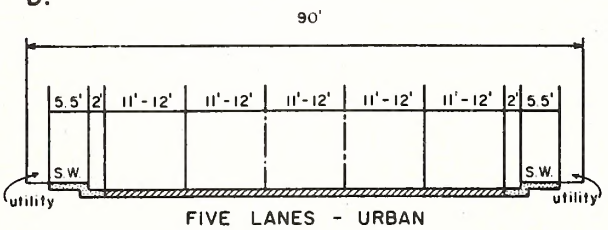
FOUR LANES DIVIDED WITH MEDIAN - RURAL

C.



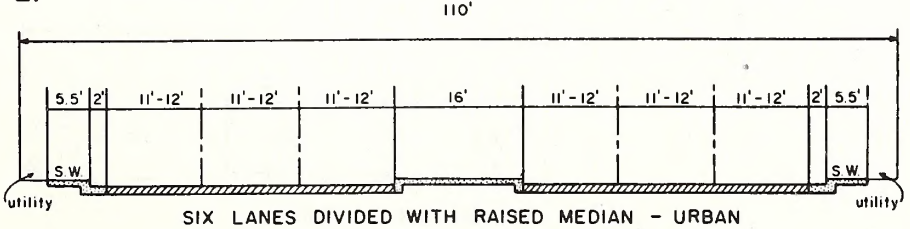
SEVEN LANES - URBAN

D.



FIVE LANES - URBAN

E.

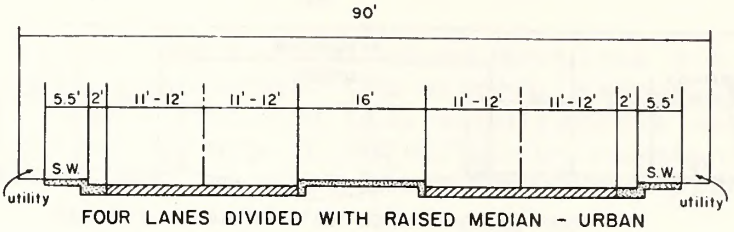


SIX LANES DIVIDED WITH RAISED MEDIAN - URBAN

FIGURE 6

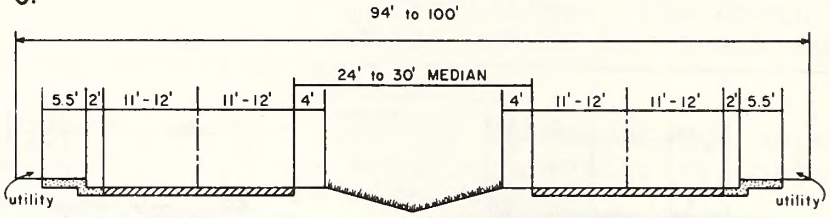
TYPICAL THOROUGHFARE CROSS SECTIONS
(CONTINUED)

F.



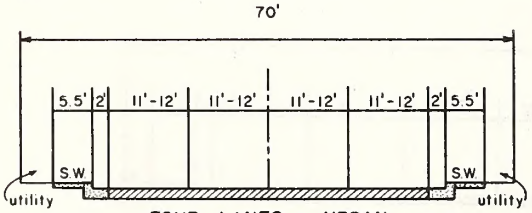
FOUR LANES DIVIDED WITH RAISED MEDIAN - URBAN

G.



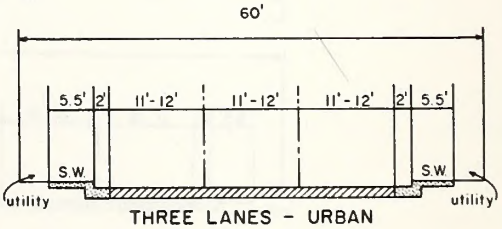
FOUR LANES DIVIDED - URBAN BOULEVARD
GRASS MEDIAN

H.



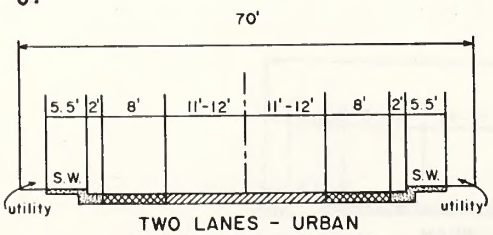
FOUR LANES - URBAN

I.



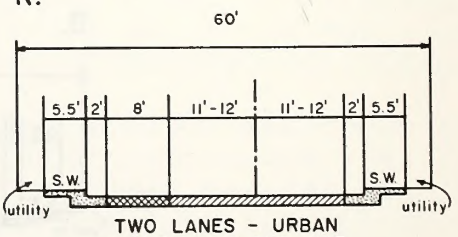
THREE LANES - URBAN

J.



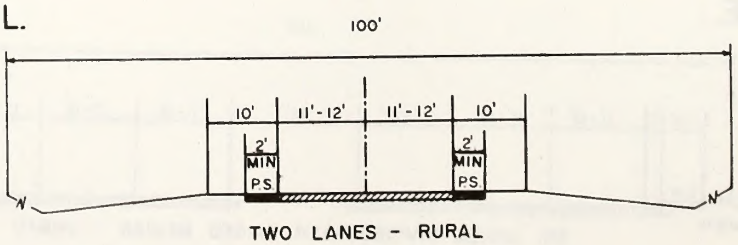
TWO LANES - URBAN
PARKING ON EACH SIDE

K.



TWO LANES - URBAN
PARKING ON ONE SIDE

L.



TWO LANES - RURAL

* * * **WINGATE** * * *

Street Inventory and Recommendations

ROADWAY / REFERENCE SECTION	EXISTING SYSTEM							RECOMMENDED PLAN			
	CROSS SECTION			PRACTICAL	AVERAGE DAILY TRAFFIC			CROSS SECTION			ADT
	DIST (MI)	RDWY (FT/LANES)	ROW (FT)	CAPACITY (VPD)	1990 (VPD)	2010 (VPD)	2020 (VPD)	RDWY (CODE/LANES)	ROW (FT)	CAPACITY (VPD)	2020 (VPD)
US 74											
PLN BDRY - END 4-LANE	1.04	48 / 4LD	220	44,200	20,600	37,200	50,000	ADQ	ADQ	ADQ	26,500
BEGIN 5-LANE - MAIN ST	0.66	68 / 5LU	100	54,400	19,300	34,800	46,800	ADQ	ADQ	ADQ	24,800
MAIN ST - BEGIN 4-LANE	0.90	68 / 5LU	150	54,400	18,100	32,700	43,900	ADQ	ADQ	ADQ	23,000
BEGIN 4-LANE - PLN BDRY	0.75	48 / 4LD	90	44,200	14,600	26,400	35,400	ADQ	ADQ	ADQ	18,800
US 74 BYPASS											
BYPASS	*	*	*	*	*	*	proposed	*	*	*	*	*	*	A / 4LD	228	44,200	25,000
ANSONVILLE ROAD (SR 1002)											
N CAMDEN - ECL WINGATE	0.68	36 / 2L	60	9,000	4,000	7,200	9,700	ADQ	ADQ	ADQ	5,700
ECL WINGATE - PHIFER RD	0.17	16 / 2L	60	6,000	4,000	7,200	9,700	L / 2L	100	9,000	5,700
PHIFER RD - PLN BDRY	1.60	20 / 2L	60	7,200	2,400	4,300	5,800	L / 2L	100	9,000	5,800
ANSONVILLE RD/US 74 CONNECTOR											
ANSONVILLE RD - US 74	*	*	*	*	*	*	proposed	*	*	*	*	*	*	L / 2L	100	9,000	5,000
AUSTIN-CHANEY/N MAIN ST (SR 1758)											
PLN BDRY - MCINTYRE RD	1.52	22 / 2L	60	8,200	800	1,400	1,900	L / 2L	100	9,000	1,900
MCINTYRE RD - NCL WINGATE	0.30	18 / 2L	60	6,600	900	1,600	2,200	L / 2L	100	9,000	2,200
NCL WINGATE - OLD WILLIAMS	0.40	24 / 2L	NA	9,000	2,900	5,200	7,000	ADQ	ADQ	ADQ	4,300
OLD WILLIAMS - US 74	0.18	33 / 2L	NA	9,000	2,900	5,200	7,000	ADQ	ADQ	ADQ	4,300
BIVENS STREET (SR 1762)											
OLD WILLIAMS - US 74	0.53	36 / 2L	NA	9,000	1,200	2,100	2,900	ADQ	ADQ	ADQ	2,000
EDGEWOOD DRIVE (SR 1762)											
US 74 CONNECTOR - MAYE ST	*	*	*	*	*	*	proposed	*	*	*	*	*	*	L / 2L	100	9,000	1,900
MAYE ST - US 74	0.45	20 / 2L	60	7,200	700	1,300	1,700	L / 2L	100	9,000	1,700

* * * **WINGATE** * * *

Street Inventory and Recommendations

ROADWAY REFERENCE SECTION	EXISTING SYSTEM							RECOMMENDED PLAN			
	CROSS SECTION			PRACTICAL	AVERAGE DAILY TRAFFIC			CROSS SECTION			ADT
	DIST (MI)	RDWY (FT/LANES)	ROW (FT)	CAPACITY (VPD)	1990 (VPD)	2010 (VPD)	2020 (VPD)	RDWY (CODE/LANES)	ROW (FT)	CAPACITY (VPD)	2020 (VPD)
MCINTYRE ROAD/US 74 CONNECTOR (SR 1631)											
PLN BDRY - AUSTIN CHANEY	0.95	18 / 2L	60	6,600	600	900	1,000	L / 2L	100	9,000	1,000
AUSTIN CHANEY - OLD WILLIAMS	*	* * * * *	*	proposed	*	* * * * *	*	L / 2L	100	9,000	2,600
OLD WILLIAMS - US 74	*	* * * * *	*	proposed	*	* * * * *	*	L / 2L	100	9,000	2,800
MONROE ANSONVILLE (SR 1751)											
PLN BDRY - AUSTIN CHANEY	2.77	20 / 2L	60	7,200	2,500	4,000	5,200	L / 2L	100	9,000	5,200
AUSTIN CHANEY - PLN BDRY	2.84	20 / 2L	60	7,200	1,000	1,600	2,000	L / 2L	100	9,000	2,000
N CAMDEN STREET (SR 1767)											
AUSTIN CHANEY - NCL WINGATE	0.30	24 / 2L	60	9,000	2,000	3,300	4,200	ADQ	ADQ	ADQ	4,000
NCL WINGATE - FACULTY ST	0.10	36 / 2L	60	9,000	3,000	4,900	6,300	ADQ	ADQ	ADQ	5,000
FACULTY ST - US 74	0.50	44 / 2L	N/A	9,000	3,000	4,900	6,300	ADQ	ADQ	ADQ	5,000
OLD HWY 74 (SR 1740)											
US 74 - PLN BDRY	1.14	18 / 2L	60	6,600	1,300	2,300	3,100	L / 2L	100	9,000	3,100
OLD MONROE ROAD (SR 1957)											
WHITE STORE RD - PLN BDRY	3.34	18 / 2L	60	6,600	1,000	1,600	2,100	L / 2L	100	9,000	2,000
OLD WILLIAMS ROAD (SR 1760)											
TRULL HINSON - NCL WINGATE	0.90	18 / 2L	60	6,600	600	1,000	1,300	L / 2L	100	9,000	1,200
NCL WINGATE - N MAIN ST	0.54	25 / 2L	60	9,000	1,000	1,600	2,100	ADQ	ADQ	ADQ	1,500
SUMMERLIN DAIRY RD (SR 1962)											
PLN BDRY - WITMORE RD	2.20	18 / 2L	60	6,600	600	1,000	1,300	L / 2L	100	9,000	1,200
WITMORE RD - US 74	*	* * * * *	*	proposed	*	* * * * *	*	L / 2L	100	9,000	700
SUMMERLIN DAIRY/US 74 CONNECTOR											
US 74 - SUMMERLIN DAIRY RD	*	* * * * *	*	proposed	*	* * * * *	*	L / 2L	100	9,000	900

* * * **WINGATE** * * *

Street Inventory and Recommendations

ROADWAY REFERENCE SECTION	EXISTING SYSTEM							RECOMMENDED PLAN			
	CROSS SECTION			PRACTICAL	AVERAGE DAILY TRAFFIC			CROSS SECTION			ADT
	DIST (MI)	RDWY (FT/LANES)	ROW (FT)	CAPACITY (VPD)	1990 (VPD)	2010 (VPD)	2020 (VPD)	RDWY (CODE/LANES)	ROW (FT)	CAPACITY (VPD)	2020 (VPD)
WITMORE ROAD (SR 1758)											
US 74 - MAYE ST	0.10	31 / 2L	N/A	9,000	1,900	3,400	4,600	ADQ	ADQ	ADQ	3,300
MAYE ST - SCL WINGATE	0.33	22 / 2L	N/A	8,200	1,900	3,400	4,600	L / 2L	100	9,000	3,300
SCL WINGATE - OLD MONROE RD	1.96	18 / 2L	60	6,600	900	1,600	2,200	L / 2L	100	9,000	2,200
OLD MONROE RD - PLN BDRY	0.20	20 / 2L	60	7,200	450	800	1,000	L / 2L	100	9,000	1,000

APPENDIX B

Recommended Definitions and Design Standards for Subdivision Ordinances

rev. 11/90

Definitions

I. Streets and Roads:

A. Rural Roads

1. Principal Arterial - A rural link in a highway system serving travel, and having characteristics indicative of substantial state wide or interstate travel and existing solely to serve traffic. This network would consist of Interstate routes and other routes designated as principal arterials.

2. Minor Arterial - A rural roadway joining cities and larger towns and providing intrastate and inter-county service at relatively high overall travel speeds with minimum interference to through movement.

3. Major Collector - A road which serves major intra-county travel corridors and traffic generators and provides access to the Arterial system.

4. Minor Collector - A road which provides service to small local communities and traffic generators and provides access to the Major Collector system

5. Local Road - A road which serves primarily to provide access to adjacent land, over relatively short distances.

B. Urban Streets

1. Major Thoroughfares - Major thoroughfares consist of Interstate and other freeway, expressway, or parkway roads, and major streets that provide for the quick movement of high volumes of traffic within and through urban areas.

2. Minor Thoroughfares - Minor thoroughfares collect traffic from local access streets and carry it to the major thoroughfare system. Minor thoroughfares may be used to supplement the major thoroughfare system by facilitating minor through-traffic movements and may also serve abutting property.

3. Local Street - A local street is any street not on a higher order urban system and serves primarily to provide direct access to abutting land.

C. Specific Type Rural or Urban Streets

1. Freeway - Divided multilane highway designed to carry large volumes of traffic at higher speeds. A freeway provides for continuous flow of vehicles with no direct access to abutting property and with access to selected crossroads only by way of interchanges. (Design speed 70 mph, Operating speed 55 mph to 65 mph)

2. Secondary Freeway - A divided multilane roadway designed to carry moderate volumes of traffic at moderate speeds. The facility provides for the continuous flow of traffic through full control of access and the provision of interchanges or grade separation with no access at cross roads, and no traffic signals. (Design speed 50-55 mph, Operating speed 40-45 mph)

3. Parkway - A divided multilane roadway designed for non-commercial traffic, with full or partial control of access. Grade separations are provided at major intersections and there are no traffic signals.

4. Expressway - A divided multilane roadway designed to carry heavy volumes of traffic with full or partial control of access. Interchanges are provided at major intersections. There may be access to service roads and local streets, but there will be no signalized intersections.

5. Secondary Expressway - A divided multilane roadway designed to carry moderate volumes of traffic at moderate speeds. This facility may have partial control of access with right turn in and right turn out access to abutting property, and interchanges at major intersections. Some minor intersections may have traffic signal control.

6. Urban Arterial - Multilane roadway with signalized intersections, and access to abutting property. May have grass or barrier type median, or middle left turn lane.

7. Residential Collector Street - A local street which serves as a connector street between local residential streets and the thoroughfare system. Residential collector streets typically collect traffic from 100 to 400 dwelling units.

8. Local Residential Street - Cul-de-sacs, loop streets less than 2,500 feet in length, or streets less than one mile in length that do not connect thoroughfares, or serve major traffic generators, and do not collect traffic from more than 100 dwelling units.

9. Cul-de-sac - A short street having only one end open to traffic and the other end being permanently terminated and a vehicular turn-around provided.

10. Frontage Road - A road that is parallel to a partial or full access controlled facility and provides access to adjacent land.

11. Alley - A strip of land, owned publicly or privately, set aside primarily for vehicular service access to the back side of properties otherwise abutting on a street.

II. Property:

A. Building Setback Line

A line parallel to the street in front of which no structure shall be erected.

B. Easement

A grant by the property owner for use by the public, a corporation, or person(s), of a strip of land for a specific purpose.

C. Lot

A portion of a subdivision, or any other parcel of land, which is intended as a unit for transfer of ownership or for development or both. The word "lot" includes the words "plat" and "parcel".

III. Subdivision:

A. Subdivider

Any person, firm, corporation or official agent thereof, who subdivides or develops any land deemed to be a subdivision.

B. Subdivision

All divisions of a tract or parcel of land into two or more lots, building sites, or other divisions for the purpose, immediate or future, of sale or building development and all divisions of land involving the dedication of a new street or change in existing streets; provided, however, that the following shall not be included within this definition nor subject to these regulations: (1) the combination of portions of previously platted lots where the total number of lots is not increased and the resultant lots are equal to or exceed the standards contained herein; (2) the division of land into parcels greater than ten acres where no street right-of-way dedication is involved; (3) widening of open streets; (4) the division of a tract in single ownership whose entire area is no greater than two acres into not more than three lots, where no street right-of-way dedication is involved and where the resultant lots are equal to or exceed the standards contained herein.

C. Dedication

A gift, by the owner, of his property to another party without any consideration being given for the transfer. The dedication is made by written instrument and is completed with an acceptance.

D. Reservation

Reservation of land does not involve any transfer of property rights. It constitutes and obligation to keep property free from development for a stated period of time.

Design Standards

I. Streets and Roads:

The design of all roads within Union County shall be in accordance with the accepted policies of the North Carolina Department of Transportation, Division of Highways, as taken or modified from the American Association of State Highway Officials' (AASHTO) manuals.

The provision of street rights-of-way shall conform and meet the recommendations of the Thoroughfare Plan, as adopted by Union County and the N.C. Department of Transportation.

The proposed street layout shall be coordinated with the existing street system of the surrounding area. Normally the proposed streets should be the extension of existing streets if possible.

The urban planning area shall consist of that area within the urban planning boundary. The rural planning area shall be that area outside the urban planning boundary.

A. Right-of-way Widths

Right-of-way (ROW) widths shall not be less than the following and shall apply except in those cases where ROW requirements have been specifically set out in the Thoroughfare Plan.

1. Rural

	Minimum ROW
a. Principle Arterial	
Freeways	350 ft.
Other	200 ft.
b. Minor Arterial	100 ft.
c. Major Collector	100 ft.
d. Minor Collector	80 ft.
e. Local Road	* 60 ft.

2. Urban

	Minimum ROW
a. Major Thoroughfare other than Freeway and Expressway	90 ft.
b. Minor Thoroughfare	70 ft.
c. Local Street	* 60 ft.
d. Cul-de-sac	** Variable

The subdivider will only be required to dedicate a maximum of 100 feet of right-of-way. In cases where over 100 feet of right-of-way is desired, the subdivider will be required only to reserve the amount in excess of 100 feet. On all cases in which right-of-way is sought for a fully controlled access facility, the subdivider will only be required to make a reservation. It is strongly recommended that subdivisions provide access to properties from internal streets, and that direct property access to major thoroughfares, principle and minor arterials, and major collectors be avoided. Direct property access to minor thoroughfares is also undesirable.

A partial width right-of-way, not less than sixty feet in width may be dedicated when adjoining undeveloped property that is owned or controlled by the subdivider; provided that the width of a partial dedication be such as to permit the installation of such facilities as may be necessary to serve abutting lots. When the said adjoining property is subdivided, the remainder of the full required right-of-way shall be dedicated.

---

* The desirable minimum right-of-way (ROW) is 60 ft. If curb and gutter is provided, 50 feet of ROW is adequate on local residential streets.

** The ROW dimension will depend on radius used for vehicular turn-around. Distance from edge of pavement of turn-around to ROW should not be less than distance from edge of pavement to ROW on street approaching turn-around.

B. Street Widths

Width for street and road classifications other than local shall be as required by the Thoroughfare Plan. Width of local roads and streets shall be as follows:

1. Local Residential

Curb and Gutter section: 26 feet, face to face of curb

Shoulder section: 20 feet to edge of pavement, 4 foot shoulders

2. Residential Collector

Curb and Gutter section: 34 feet, face to face of curb

Shoulder section: 20 feet to edge of pavement, 6 foot shoulders

C. Geometric Characteristics

The standards outlined below shall apply to all subdivision streets proposed for addition to the State Highway System or Municipal Street System. In cases where a subdivision is sought adjacent to a proposed thoroughfare corridor, the requirements of dedication and reservation discussed under the Right-of-Way section shall apply.

1. Design Speed - The design speed for a roadway should be a minimum of 5 mph greater than the posted speed limit. The design speeds for subdivision type streets shall be:

DESIGN SPEEDS			
Facility Type	Desirable Speed	Minimum Speed Level	Rolling
Rural			
Minor Collector Roads	60	50	40
Local roads, including Residential Collectors and Local Residential	50	* 50	* 40
Urban			
Major Thoroughfares, other than Freeway, Expressway, or Parkway	60	50	50
Minor Thoroughfares	60	50	40
Local Streets	40	** 40	** 30

---

* Based on projected annual average daily traffic of 400-750. In cases where road will serve a limited area and small number of dwelling units, minimum design speeds can be reduced further.

** Based on projected annual average daily traffic of 50-250.

2. Maximum and Minimum Grades -

a. The maximum grades in percent shall be:

MAXIMUM VERTICAL GRADE		
Design Speed	Terrain Level	Rolling
60	4	5
50	5	6
40	6	7
30		9

b. A minimum grade for curbed streets should not be less than 0.5%.

c. Grades for 100 feet each way from intersections (measured from edge of pavement) should not exceed 5%.

d. For streets and roads with projected annual average daily traffic less than 250, short grades less than 500 feet long may be 50% greater than the value in the above table.

3. Minimum Sight Distance - In the interest of public safety, no less than the minimum sight distance applicable shall be provided. Vertical curves that connect each change in grade shall be provided and calculated using the following parameters:

SIGHT DISTANCE				
Design Speed, MPH	30	40	50	60
Stopping Sight Distance:				
Minimum (ft.)	200	275	400	525
Desirable Minimum (ft.)	200	325	475	650
Minimum K* Value for:				
Crest Curve	30	80	160	310
Sag Curve	40	70	110	160

(General practice calls for vertical curves to be multiples of 50 feet. Calculated lengths shall be rounded up in each case.)

Sight distance provided for stopped vehicles at intersections should be in accordance with "A Policy on Geometric Design of Highways and Streets, 1984."

---

* K is a coefficient by which the algebraic difference in grade may be multiplied to determine the length in feet of the vertical curve which will provide the desired sight distance.

4. Superelevation - the "Superelevation Table" below shows the maximum degree of curve and related maximum superelevation for design speeds. The maximum rate of roadway superelevation (e) for rural roads with no curb and gutter is 0.08. The maximum rate of superelevation for urban streets with curb and gutter is 0.06, with 0.04 being desirable.

SUPERELEVATION TABLE

Design Speed	Maximum e*	Minimum Radius ft.	Max. Deg. of Curve
30	0.04	302	19 00′
40	0.04	573	10 00′
50	0.04	955	6 00′
60	0.04	1,528	3 45′
30	0.06	273	21 00′
40	0.06	509	11 15′
50	0.06	849	6 45′
60	0.06	1,380	4 15′
30	0.08	252	22 45′
40	0.08	468	12 15′
50	0.08	764	7 30′
60	0.08	1,206	4 45′

* e = rate of roadway superelevation, foot per foot

D. Intersections

1. Streets shall be laid out so as to intersect as nearly as possible at right angles, and no street should intersect any other street at an angle less than sixty-five (65) degrees. No street should intersect a railroad at grade at an angle less than (65) degrees.

2. Property lines at intersections should be set so that the distance from the edge of pavement, of the street turnout, to the property line will be at least as great as the distance from the edge of pavement to the property line along the intersection streets. This property line can be established as a radius or as a sight triangle. Greater offsets from the edge of pavement to the property lines will be required, if necessary, to provide sight distance for the stopped vehicle on the side street.

3. Offset intersections are to be avoided. Intersections which cannot be aligned should be separated by a minimum length of 200 feet between survey centerlines.

E. Cul-de-sacs

Cul-de-sacs shall not be more than five hundred (500) feet in length (for control of speed, visual detection of a dead end street, and for fire protection). The distance from the edge of pavement on the vehicular turnaround to the right-of-way line should not be less than the distance from the edge of pavement to right-of-way line on the street approaching the turnaround. Cul-de-sacs should not be used to avoid connection with an existing street or to avoid the extension of an important street.

F. Alleys

1. Alleys shall be required to serve lots used for commercial and industrial purposes. This requirement may be waived where other definite and assured provision is made for service access. Alleys shall not be provided in residential subdivisions unless necessitated by unusual circumstances.

2. The width of an alley shall be at least twenty (20) feet.

3. Dead-end alleys shall be avoided where possible, but if unavoidable, shall be provided with adequate turnaround facilities at the dead-end as may be required by the Planning Board.

G. Permits For Connection To State Roads

An approved permit is required for connection to any existing state system road. This permit is required prior to any construction on the street or road. The application is available at the office of the District Engineer of the Division of Highways.

H. Offsets To Utility Poles

Poles for overhead utilities should be located clear of roadway shoulders, preferably a minimum of at least 30 feet from the edge of pavement. On streets with curb and gutter, utility poles shall be set back a minimum distance of 6 feet from the face of curb.

I. Wheelchair Ramps

All street curbs being constructed or reconstructed for maintenance purposes, traffic operations, repairs, correction of utilities, or altered for any reason, shall provide wheelchair ramps for the physically handicapped at intersections where both curb and gutter and sidewalks are provided and at other major points of pedestrian flow.

J. Horizontal Width on Bridge Deck

1. The clear roadway widths for new and reconstructed bridges serving 2-lane, 2-way traffic should be as follows:

   a. Shoulder section approach

      i. Under 800 ADT design year:

         Minimum 28-foot width face to face of parapets of rails, or pavement width plus 10 feet, whichever is greater.

      ii. 800 - 2000 ADT design year:

         Minimum 34-foot width face to face of parapets of rails or pavement width plus 12 feet, whichever is greater.

      iii. Over 2000 ADT design year:

         Minimum 40-foot width, desirable 44-foot width face to face of parapets of rails.

   b. Curb and gutter approach

      i. Under 800 ADT design year:

         Minimum 24-foot face to face of curbs.

      ii. Over 800 ADT design year:

         Width of approach pavement measured face to face of curbs.

   Where curb and gutter sections are used on roadway approaches, curbs on bridges shall match the curbs on approaches in height, in width of face to face of curbs, and in crown drop. The distance from face of curb to face of parapet or rail shall be 1'6" minimum, or greater if sidewalks are required.

2. The clear roadway widths for new and reconstructed bridges having 4 or more lanes serving undivided two-way traffic should be as follows:

   a. Shoulder section approach - Width of approach pavement plus width of usable shoulders on the approach left and right. (Shoulder width 8-foot minimum, 10-foot desirable.)

   b. Curb and gutter approach - Width of approach pavement measured face to face of curbs.